Constexpr Functions Solutions

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constexpr functions

- What is a constexpr function?
  - A constexpr function performs computations on constant expressions and return a constant expression
  - The computations are performed at compile time
  - Constexpr functions are implemented using a compile-time interpreter which supports most of C++
- What advantages do constexpr functions have over template metaprogramming?
  - Constexpr functions are written in normal C++ code
  - Error messages are similar to normal compiler error messages (as opposed to unreadable template error messages)

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constexpr function

- What are the requirements for a constexpr function?
  - A constexpr function must be "pure"
  - It cannot modify its arguments, and cannot modify global or static variables
  - The body of a constexpr function must not contain any code that could cause an action at runtime
- How do we make a function constexpr?
  - To make a function constexpr, we put the constexpr keyword before its return type

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Run-time constexpr functions

- What happens if a constexpr function is called with arguments that are not constant expressions?
  - If a constant expression return value is not required, then the function is evaluated at runtime
  - However, if a constant return value is required, this is not allowed
- Why is this useful?
  - It avoids the need to write a non-constexpr version of the function
  - This would be identical except for the "constexpr" keyword

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constexpr member functions

- What does it mean for a member function to be
  - const
  - The member function can access data members of the object through the "this" pointer, but cannot modify them
  - constexpr
  - The member function returns an constant expression

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